

# Claims

[c1] What is claim is:

1.A method of speeding up packet filtering used in a network security apparatus comprising:  
generating a first hash space according to at least one rule used to filter the packets received by the network security apparatus, and the first hash space presenting a mask characteristic value set;  
generating a second hash space according to at least one of the packets received by the network security apparatus, and the second hash space with the same size as the first hash space, presenting a packet characteristic value set;  
performing a specific Boolean operation with the first hash space and the second hash space; and  
determining whether the packet characteristic value set is out of the mask characteristic value set, according to the results of said Boolean operation, then it is decided whether the packet is allowed to pass through the network security apparatus.

[c2] 2.The method of speeding up packet filtering in claim 1 wherein the network security apparatus comprises a fire-

wall so that the rule can be pre-installed in the firewall.

[c3] 3.The method of speeding up packet filtering in claim 2 wherein the firewall comprises a search filter assisting the rule of the firewall to filter the packets.

[c4] 4.The method of speeding up packet filtering in claim 1 wherein the content of each rule comprises at least a specific mask that needs to be filtered.

[c5] 5.The method of speeding up packet filtering in claim 4 further comprising:  
converting the specific mask in each rule into binary codes;  
converting each relative address with bit values "1" in the binary codes into a corresponding address pointing to the first hash space in order to obtain a set of the corresponding addresses, with regard to each said specific mask, pointing to the first hash space; and  
collecting each set of the corresponding addresses pointing to the first hash space together thereby presenting a mask characteristic value set with regard to all of said specific masks in the first hash space.

[c6] 6.The method of speeding up packet filtering in claim 5 further comprising:  
utilizing the relative address with bit values "1" in the bi-

nary codes to be a key of at least a specific hash function, and then performing the hash operation to obtain each corresponding address pointing to the first hash space.

[c7] 7.The method of speeding up packet filtering in claim 5 further comprising:

generating a first hash space, with regard to each specific mask, having a specific mask characteristic value, according to each set of the corresponding addresses pointing to the first hash space; and  
totaling each bit value with the same address in each said first hash space having specific mask characteristic value thereby presenting a mask characteristic value set with regard to all of the specific masks in one first hash space.

[c8] 8.The method of speeding up packet filtering in claim 1 wherein each packet comprises at least an IP address that needs to be checked.

[c9] 9.The method of speeding up packet filtering in claim 8 further comprising:  
converting at least one IP address in each packet into binary codes;  
converting each relative address with bit value "1" in the binary codes into a corresponding address pointing to

the second hash space thereby obtaining a set of corresponding addresses, with regard to each said IP address, pointing to the second hash space; and  
collecting each set of the corresponding addresses pointing to the second hash space together thereby presenting a packet characteristic value set with regard to the at least one packet in the second hash space.

[c10] 10.The method of speeding up packet filtering in claim 9 further comprising:

utilizing each said relative address with bit value "1" in the binary codes to be a key of at least a specific hash function, and then performing a hash operation thereby obtaining each corresponding address pointing to the second hash space.

[c11] 11.The method of speeding up packet filtering in claim 9 further comprising:

generating the second hash space, with regard to each said IP address, having a specific IP address characteristic value, according to each set of the corresponding addresses pointing to the second hash space; and  
totaling each bit value with same address in each said second hash space having specific IP address characteristic value thereby presenting a packet characteristic value set with regard to the at least one packet in one second hash space.

[c12] 12.The method of speeding up packet filtering in claim 1 further comprising:

when at least one of bit values of the results of the Boolean operation in the first hash space and the second hash space is out of value "0", it is ensured that the packet characteristic value set is out of the mask characteristic value set and therefore the packet can be allowed to pass through the network security apparatus.

[c13] 13.A method of speeding up packet filtering used in a network security apparatus, including a method of generating a mask characteristic value set with regard to all specific masks that need to be filtered, comprising the steps of:

extracting each of the specific masks from at least one rule pre-installed in the network security apparatus;  
converting each of the specific masks into binary codes;  
converting each relative address with bit value "1" in the binary codes into a corresponding address pointing to a hash space thereby obtaining a set of the corresponding addresses, with respect to each specific mask, pointing to the hash space; and

collecting the each set of the corresponding addresses pointing to the hash space together thereby presenting a mask characteristic value set with regard to all of the specific masks in the hash space.

[c14] 14.The method of speeding up packet filtering in claim 13 further comprising:  
utilizing each said relative address with bit value "1" in the binary codes to be a key of at least a specific hash function, and then performing a hash operation to obtain said corresponding address pointing to the hash space.

[c15] 15.The method of speeding up packet filtering in claim 13 further comprising:  
generating a hash space, with regard to each specific mask, having a specific mask characteristic value, according to each set of the corresponding addresses pointing to the hash space; and  
totaling each bit value with the same address in each said hash space having specific mask characteristic value thereby presenting a mask characteristic value set with regard to all of the specific masks in one hash space.

[c16] 16.The method of speeding up packet filtering in claim 13 further comprising:  
setting the bit values of all sets of the corresponding addresses pointing to the hash space to be "1" thereby presenting a mask characteristic value set with regard to all of the specific masks in the hash space.

[c17] 17.A method of speeding up packet filtering used in a

network security apparatus, including a method of generating a packet characteristic value set with regard to specific IP addresses that needs to be checked, comprising:

extracting each specific IP address from at least one packet received from the network security apparatus;  
converting the each specific IP address in each packet into binary codes;  
converting each relative address with bit value "1" in the binary codes into a corresponding address pointing to a hash space in order to obtain a set of the corresponding addresses, with regard to each of the specific IP addresses, pointing the hash space; and  
collecting all sets of the corresponding addresses pointing to the hash space together thereby presenting a packet characteristic value set with regard to the packet in the hash space.

[c18] 18.The method of speeding up packet filtering in claim 17 further comprising:

utilizing each relative address with bit value "1" in the binary codes to be a key of at least a specific hash function, and then performing a hash operation to obtain the corresponding address pointing to the hash space.

[c19] 19.The method of speeding up packet filtering in claim 17 further comprising:

generating a hash space, with regard to each of the specific IP address, having a specific IP address characteristic value, according to each set of the corresponding addresses pointing to the hash space; and  
totaling each bit value with the same address in each said hash space having a specific IP address characteristic value thereby presenting a packet characteristic value set with regard to the at least one packet in the hash space.

[c20] 20. The method of speeding up packet filtering in claim 17 further comprising:  
setting the bit values of all sets of the corresponding addresses pointing to the hash space to "1" in order to present the packet characteristic value set.